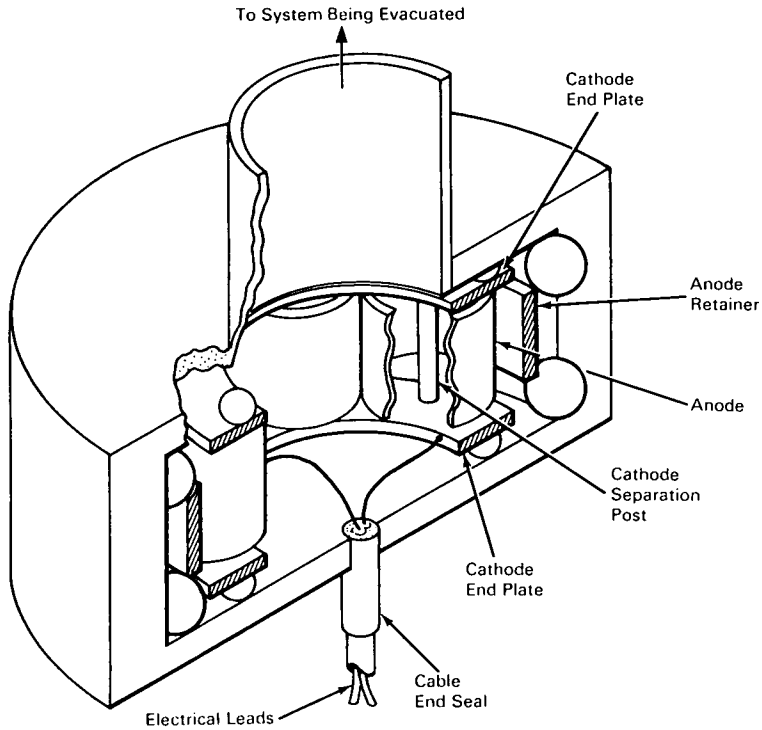
August 1965

Brief 65-10239

NASA TECH BRIEF

Ion Pump Provides Increased Vacuum Pumping Speed



The problem: To design a magnetron ion pump that will have a greater vacuum pumping speed than a single-cell magnetron pump. In this type of pump, residual gas molecules to be evacuated from a chamber are converted to ions and electrons which are then trapped on a cathode-anode assembly in the presence of a transverse magnetic field.

The solution: A multiple-cell ion pump, consisting of eight cathode-anode magnetron cells arranged in a cylinder. This type of construction increases the surface area of the cathode, resulting in increased pumping speed.

How it's done: The cathode-anode assembly is mounted within and insulated from a flanged housing. The system to be evacuated is connected through a tube welded to one side of the housing. An end seal containing the electrical leads to the anode and cathode assembly is welded to the other side of the housing.

The cathode-anode assembly consists of two cathode end plates and eight cylindrical anodes. The cathode end plates are constructed in the form of two annular disks separated by eight cylindrical metal posts. The axes of the cylindrical anodes coincide with the axes of the eight cathode separation posts. The

(continued overleaf)

eight anodes are maintained in physical contact by an annular anode retainer which is held in place in the housing by means of eight ceramic spheres. Another set of ceramic spheres secures the cathode end plates within the housing.

The ion pump is easily dismantled for cleaning or modification. The cathode plates and posts can be interchanged with plates and posts of different materials. Thin titanium sheet material can be spot-welded to the cathode plates and posts for conversion to getter-ion operation.

Notes:

1. This ion pump should find application for producing ultrahigh vacuums in vacuum tubes, mass spectrometers, electron microprobes, electron microscopes, and X-ray diffraction systems.
2. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Electronic Research Center
   575 Technology Square
   Cambridge, Massachusetts, 02139
   Reference: B65-10239

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Geophysics Corporation of America
under contract to
Electronic Research Center
(NEO-13)